60% of the Final will be:

Chapter 13 How Populations Evolve

Chapter Objectives

Darwin’s Theory of Evolution

13.1 Explain how Darwin’s voyage on the Beagle influenced his thinking.

13.1 Describe the ideas and events that led to Darwin’s 1859 publication of The   
Origin of Species.

13.2 Explain how the work of Thomas Malthus and the process of artificial selection influenced Darwin’s development of the idea of natural selection.

13.2 Describe Darwin’s observations and inferences in developing the concept of natural selection.

13.2 Explain why individuals cannot evolve and why evolution does not lead to   
perfectly adapted organisms.

13.3 Describe two examples of natural selection known to occur in nature. Note two key points about how natural selection works.

13.5 Explain how biogeography, comparative anatomy, and molecular biology   
support evolution.

The Evolution of Populations

13.7 Define the gene pool, a population, and microevolution.

13.8 Explain how mutation and sexual reproduction produce genetic variation.

13.8 Explain why prokaryotes can evolve more quickly than eukaryotes.

13.9 Describe the five conditions required for the Hardy-Weinberg equilibrium.

Mechanisms of Microevolution

13.11 Define genetic drift and gene flow. Explain how the bottleneck effect and the founder effect influence microevolution.

13.11 Explain how genetic bottlenecks threaten the survival of certain species.

13.12 Explain why natural selection is the only mechanism that consistently leads to adaptive evolution.

13.15 Explain how antibiotic resistance has evolved.

13.16 Explain how genetic variation is maintained in populations.

13.17 Explain why natural selection cannot produce perfection.

Chapter 14: The Origin of Species

Defining Species

14.1 Distinguish between microevolution and speciation.

14.2 Compare the definitions, advantages, and disadvantages of the different species concepts.

14.3 Describe five types of prezygotic barriers and three types of postzygotic barriers that prevent populations of closely related species from interbreeding.

Mechanisms of Speciation

14.4 Explain how geologic processes can fragment populations and lead to   
speciation.

Chapter 15 Tracing Evolutionary History

Chapter Objectives

Early Earth and the Origin of Life

15.1 Describe the conditions on the surface of the early Earth. Describe the evidence that life on Earth existed at least 3.5 billion years ago.

15.2 Describe the experiments of Stanley Miller and others in understanding how life might have first evolved on Earth.

15.3 Describe the significance of protocells and ribozymes in the origin of the first cells.

Mechanisms of Macroevolution

15.10 Explain how and why adaptive radiations occur.

15.13 Explain why evolutionary trends do not reflect “directions” or “goals.”

Phylogeny and the Tree of Life

15.14 Distinguish between homologous and analogous structures and provide examples of each. Describe the process of convergent evolution.

15.15 Describe the goals of systematics. List the progressively broader categories of classification used in systematics in order, from most specific to most general.

15.16 Be able to interpret a cladogram/phylogenic tree.

Chapter 12 DNA Technology and Genomics

Chapter Objectives

Opening Essay

Explain why DNA technology is important.

Gene Cloning

12.1 Explain how plasmids are used in gene cloning.

12.2 Explain how restriction enzymes are used to “cut and paste” DNA into   
plasmids.

12.5 Explain how a nucleic acid probe can be used to identify a specific gene.

Genetically Modified Organisms

12.6 Explain how different organisms are used to mass-produce proteins of human interest.

12.7 Explain how DNA technology has helped to produce insulin, growth hormone, and vaccines.

12.8 Explain how genetically modified (GM) organisms are transforming   
agriculture.

12.9 Describe the risks posed by the creation and culturing of GM organisms and the safeguards that have been developed to minimize these risks.

DNA Profiling

12.12 Explain how PCR is used to amplify DNA sequences.

12.13 Explain how gel electrophoresis is used to sort DNA and proteins.

Chapter 16 Microbial Life: Prokaryotes and Protists

Chapter Objectives

Prokaryotes

16.1 Describe the diverse roles and abundance of prokaryotic life.

16.2 Compare the different shapes, cell walls, and projections of prokaryotes.

16.3 Explain how bacteria can evolve quickly and how bacteria can survive stressful environments.

16.6 Explain how prokaryotes are employed to address the needs of human society.

16.8 Describe the diverse types of Archaea living in extreme and more moderate   
environments.

16.10 Describe some of the diseases associated with bacteria. Distinguish between exotoxins and endotoxins, noting examples of each.

16.12 Describe the recent U.S. attacks using bacteria and the effectiveness of anthrax as a weapon.

**The balance of the final will include questions from**:

Chapters

6: Basics of Cellular respiration

8: The cellular basis of Reproduction

9: Patterns of Inheritance

10.2 - 10.15: Structure of DNA, DNA Replication and Gene Flow

10.17 – 10.20 viruses

Immunology (Ch 24)